Occupational Health – Zoonotic Disease Fact Sheets

RABIES

KEY FACTS:

- Rabies is a vaccine-preventable viral disease that affects the central nervous system of mammals, including humans, and occurs in more than 150 countries and territories around the world.
- Primary reservoirs vary geographically, e.g. foxes, bats, raccoons, skunks, dogs, cats, cattle, and others. In the U.S. and Canada, wildlife rabies most frequently involves skunks, raccoons, and bats.
- Worldwide it is estimated that over 70,000 people die annually from rabies. However, human rabies deaths are rare in the United States.
- In up to 99 percent of human cases, the rabies virus is transmitted by domestic dogs.
- Prompt treatment following exposure to a bite from an animal suspected of having rabies can prevent human illness. However, once symptoms appear, it is almost always fatal.

SPECIES: All mammals (dogs, cats, cattle, horses, etc.) and humans.

CAUSATIVE AGENT: Rabies Lyssavirus, a negative-stranded RNA virus of the Rhabdovirus family.

TRANSMISSION: The virus is found in saliva and most often enters the body via bite, scratch, or abrasion. Transmission has also been documented via other routes such as contamination of mucous membranes (e.g., eyes, nose, mouth). Inhalation of aerosolized rabies virus is a potential non-bite route of exposure and has been documented as a laboratory acquired infection. The only well-documented cases of rabies caused by human-to-human transmission has occurred among recipients of transplanted corneas and solid organs.

DISEASE IN ANIMALS: Rabid animals of all species exhibit typical signs of central nervous system disturbance, with minor variations peculiar to carnivores, ruminants, bats, and humans. The clinical course, particularly in dogs, can be divided into 3 phases: the prodromal, the excitative, and the paralytic. The term "furious rabies" refers to animals in which the excitative phase is predominant, and "dumb or paralytic rabies" to those in which the excitative phase is extremely short or absent, and the disease progresses quickly to the paralytic phase.

The prodromal stage usually lasts from 1-3 days (2-3 for dogs and 1-2 for cats). In any animal, the first sign is a change in behavior (apprehension, nervousness, anxiety, solitude), which may be indistinguishable from a GI disorder, injury, foreign body in the mouth, poisoning, or an early infectious disease. Temperature change or fever is not significant. Animals usually stop eating and drinking and may seek solitude. Frequently, the urogenital tract is irritated or stimulated as evidenced by frequent urination, erection in the male, and sexual desire. After the prodromal period of 1-3 days, animals either show signs of paralysis or become vicious. Carnivora, pigs, and occasionally, horses and mules bite other animals or people at the slightest provocation. Cattle butt any moving object. The disease progresses rapidly after the onset of paralysis, and

death is virtually certain within 10 days of the first symptoms. Rabid domestic cats and bobcats attack suddenly, biting and scratching viciously. Rabid foxes frequently invade yards or even houses, attacking dogs and people. Rabid foxes and skunks are responsible for most pasture cattle losses and have attacked cattle in barns. The rabid raccoon is characterized by its loss of fear of people, its frequent aggression and incoordination, and its activity during the day, being predominantly a nocturnal animal. In urban areas, they often attack domestic dogs. Bats flying in the daytime are probably rabid.

DISEASE IN HUMANS: The incubation period for rabies is typically 1-3 months but may vary from less than one week to greater than one year, depending on the distance the virus must travel to the central nervous system. Early symptoms can include fever and tingling at the site of exposure. Pain appears at the site of the bite, followed by a prickling or burning sensation. The skin is quite sensitive to changes of temperature, especially air currents. As the disease progresses, the person may experience delirium, abnormal behavior, extreme excitability, hallucinations, muscle spasms, laryngospasm, and insomnia. Once clinical signs of rabies appear, the disease is nearly always fatal, and treatment is typically supportive.

DIAGNOSIS: Consider Rabies as a possible problem in any wild caught or random-source laboratory animal of unknown vaccination history showing central nervous system signs or symptoms. No one specific test is available to diagnose rabies infection in humans before the onset of clinical disease, and unless the rabies-specific signs of hydrophobia or aerophobia are present, the clinical diagnosis may be difficult. A variety of tests are performed on samples of saliva, serum, spinal fluid, and skin biopsies of hair follicles at the nape of the neck. Saliva can be tested by virus isolation or reverse transcription followed by polymerase chain reaction. Serum and spinal fluid are tested for antibodies to rabies virus. Skin biopsy specimens are examined for rabies antigen in the cutaneous nerves at the base of hair follicles.

TREATMENT: This very severe illness with an almost universally fatal outcome requires skillful intensive care with attention to the airway, maintenance of oxygenation, and control of seizures. Rabies postexposure prophylaxis consists of a dose of human rabies immune globulin and rabies vaccine given on the day of the exposure, and then a dose of vaccine given again on days 3, 7, and 14. If a person has previously received postexposure vaccinations or received preexposure vaccinations, only two doses of vaccine (on the day of exposure and then 3 days later) are needed.

PREVENTION/CONTROL: Pre-exposure vaccination of high-risk personnel, such as laboratory workers and individuals working with animals who could be potentially exposed, is recommended. Vaccinating domestic dogs and cats is also a recommended strategy for preventing rabies in humans. The virus is destroyed rapidly at greater than 50 C and survives no more than a few hours at room temperature (can persist for years in frozen tissues). Additionally, only conduct projects in laboratories with proper engineering controls and train staff members in the proper use of required personal protective equipment when they are in spaces containing live agent.

More information on rabies can be found on the Centers for Disease Control and Prevention website at: https://www.cdc.gov/rabies/